REMARKS

Claims 1-16 were examined. Claims 17-37 have been withdrawn from consideration pursuant to a restriction requirement. All examined claims were rejected. Claims 1, 8, 10, 12, and 13 have been amended. Claims 5-7 and 17-37 have been cancelled. Claims 38-47 have been added. Reexamination and reconsideration of pending claims 1-4, 8-16, and 38-47 are respectfully requested.

The Restriction Requirement

Applicants hereby affirm election to prosecute the invention of Group I, including claims 1-16. Claims 17-37 have been cancelled pursuant without prejudice against refiling in a subsequent application.

Rejections Under 35 U.S.C. §103

Claims 1-16 have been rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 5,462,784, issued to Grill et al., in view of U.S. Patent No. 5,374,318, issued to Rabalais et al. Such a rejection is traversed in-part and overcome in-part as follows.

As a preliminary matter, Applicants note that independent claim 1 (and newly independent claims 8, 12, and 13) has been amended to recite that carbon from the ions is deposited over the magnetic layer. Applicants note that this amendment is for the purposes of more clearly setting forth the present method for producing magnetic recording media, in which a carbon layer will generally comprise a protective layer disposed over the magnetic layer. The magnetic layer had previously been introduced into the claim. Support for this amendment is found at least in the description of Fig. 1 in the application as originally filed for this case.

Now addressing each of the claims in order, Applicants have further amended independent claim 1 to more clearly recite

that the plasma is energized in a plasma chamber, while deposition of the carbon takes place in a separate deposition chamber. Furthermore, claim 1 now recites that the ions are energized to form a stream from the plasma chamber straight toward the substrate in the deposition chamber. Finally, claim 1 has also been amended to recite that the impacting ions have a substantially uniform weight. Such a method is nowhere to be found in the Rabalais et al. and Grill et al. references.

With regard to the Grill et al. patent, Applicants note that that plasma enhanced chemical vapor deposition method is performed by loading the device to be coated into the plasma reactor. See column 3, lines 23-26. After loading, the reactor is pumped and reactant gases flow directly into the reactor and a plasma is ignited so that the device is in the plasma until the required thickness of coating is obtained. See column 3, lines 26-36. Hence, no stream of ions is formed from one chamber to another chamber, as now recited by claim 1.

Although ions do travel between chambers in the Rabalais et al. patent, Applicants note that that method requires a mass selection apparatus in which the ions pass through a 60° angle 5 so that only a desired species is transmitted. See column 12, lines 25-26; column 14, lines 12-29. The Rabalais et al. reference describes the small size of the ion beam resulting from this bent stream method as a significant disadvantage. See column 17, lines 7-11. Applicants further note that the ion stream deflection equipment makes it difficult to practicably incorporate such a structure into existing magnetic recording media production equipment. Regardless, the deflected stream of the Rabalais et al. method (required by that device to select desired ion species from a wide variety of particles) is directly contrary to the straight plasma stream now recited by independent claim 1.

With regard to independent claim 8, this claim has been amended to recite that a solid carbon cathode is heated sufficiently to produce an arc that is distributed over the cathode so as to inhibit the ejection of macroparticles. As described in the specification beginning on page 27, line 34

cathodic arc deposition methods using solid carbon cathodes generally result in discreet arc spots or jets which eject large numbers of macroparticles. Such macroparticles were previously removed using stream deflection systems such as the 60° angle described by Rabalais et al. As described beginning on page 29, line 9, the present invention instead reduces macroparticle ejection by raising the temperature of the cathode so that a more stable arc is distributed across the cathode surface. As described on page 31, lines 6-8, reduction of macroparticles can reduce cleaning and maintenance of a filter duct, and may even allow straight unfiltered deposition.

Applicants note that they amended previously dependent claim 8 to independent form. As the Grill et al. and Rabalais et al. references fail to teach or even remotely suggest the distributed arc method for producing magnetic recording media recited by independent claim 8, Applicants respectfully request that the rejections be removed and that the claim be allowed.

Previously dependent claim 12 recited applying an alternating potential between a coupling electrode and an extraction grid so that the plasma is self-biasing relative to the extraction grid. Applicants have amended claim 12 to independent form, further specifying that the ion stream produced from the self-biasing plasma is quasi neutral. Such a quasi neutral stream, which will typically include both an ion current and an electron current as described with reference to Fig. 3B, is not reasonably taught or suggested by any combination of the Grill et al. reference (in which the reference to be coated is placed directly in the plasma reaction chamber), and the Rabalais et al. reference (in which the ion beam is produced directly by a voltage bias, and hence is not neutral or quasi neutral). Once again, the Applicants have amended claim 12 to independent form.

Applicants have also amended claim 13 to independent form. Claim 13 recites that the source material comprises a gas having a substantially coherent dissociation energy spectra. As described beginning on page 18, line 23, the plasma composition depends on the various chemical pathways in the plasma. As a result, a number of different ions (having a number of different

weights) may be present, making uniform deposition of homogenous materials fairly problematic. However, by using a source material which produces a mass spectra dominated by a particular ion species, uniform ion species weights can be uniformly energized so as to greatly enhance sp^3 carbon-carbon bonds. For example, acetylene produces a plasma beam which is dominated by hydrocarbon ions having two carbon atoms, collectively referred to as the C_2 species. As neither Grill et al. nor Rabalais et al. have been shown to recognized the advantages of using a source material having a coherent dissociation spectra for production of magnetic recording media, prima facia obviousness of the invention claimed by independent claim 13 has not been established.

In light of the above, Applicants respectfully submit that independent claims 1, 18, 12, and 13 are now in condition for allowance. The dependent claims are allowable both as depending from allowable base claims, as well as for the novel elements recited therein.

The Added Claims

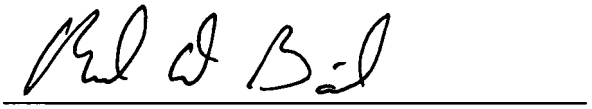
Applicants have added claims 38-45 to more fully claim the present invention. Dependent claims 38-44 depend from independent claim 1, and further recite the use of a combination of capacitive coupling (for energizing the ions so as to form an ion stream) and inductive coupling (so as to excite the plasma) which is nowhere to be seen in the Grill et al. and Rabalais et al. references. Independent claim 45 similarly recites a combination of inductive ionization and capacitatively energizing an ion stream for the production of magnetic recording media. Dependent claims 46, 47, and 41-44 further recite the use of magnetic fields to densify the plasma, as described in detail with reference to Figs. 2, 2A, and 4A-D.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at (650) 326-2400.

Respectfully submitted,



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